

FAIRCHILD

A Schlumberger Company

PN/MPS/FTSO3638 T-37-15
PN/MPS/FTSO3638A

PNP Small Signal General Purpose
Amplifiers & Switches

- $V_{CE0} \dots -25 \text{ V (Min)}$
- $h_{FE} \dots 30 \text{ (Min) (PN/MPS/FTSO3638),}$
 $100 \text{ (Min) (PN/MPS/FTSO3638A) @ } 50 \text{ mA}$
- $t_{on} \dots 75 \text{ ns (Max) @ } 300 \text{ mA; } t_{off} \dots 170 \text{ ns (Max) @ } 300 \text{ mA}$
- Complements ... PN3641, PN3643

PACKAGE

PN3638	TO-92
PN3638A	TO-92
MPS3638	TO-92
MPS3638A	TO-92
FTSO3638	TO-236AA/AB
FTSO3638A	TO-236AA/AB

ABSOLUTE MAXIMUM RATINGS (Note 1)

Temperatures

Storage Temperature	-55° C to 150° C
Operating Junction Temperature	150° C

Power Dissipation (Notes 2 & 3)

Total Dissipation at	PN/MPS	FTSO
25° C Ambient Temperature	0.625 W	0.350 W*
25° C Case Temperature	1.0 W	

Voltages & Currents

V_{CE0} Collector to Emitter Voltage (Note 4)	-25 V
V_{CBO} Collector to Base Voltage	-25 V
V_{CES} Collector to Emitter Voltage	-25 V
V_{EBO} Emitter to Base Voltage	-4.0 V
I_C Collector Current (Note 2)	500 mA

ELECTRICAL CHARACTERISTICS (25° C Ambient Temperature unless otherwise noted) (Note 6)

SYMBOL	CHARACTERISTIC	3638		3638A		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
BV_{CES}	Collector to Emitter Breakdown Voltage	-25		-25		V	$I_C = 100 \mu\text{A}, V_{BE} = 0$
BV_{CBO}	Collector to Base Breakdown Voltage	-25		-25		V	$I_C = 100 \mu\text{A}, V_{BE} = 0$
BV_{EBO}	Emitter to Base Breakdown Voltage	4.0		4.0		V	$I_E = 100 \mu\text{A}, I_C = 0$
I_{CES}	Collector Reverse Current		35 2.0		35 2.0	nA μA	$V_{CE} = -15 \text{ V}, V_{BE} = 0$ $V_{CE} = -15 \text{ V}, V_{BE} = 0,$ $T_A = 65^\circ \text{C}$

NOTES:

- These ratings are limiting values above which the serviceability of any individual semiconductor device may be impaired.
- These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.
- These ratings give a maximum junction temperature of 150° C and (TO-92) junction-to-case thermal resistance of 125° C/W (derating factor of 8.0 mW/° C); junction-to-ambient thermal resistance of 200° C/W (derating factor of 5.0 mW/° C); (TO-236) junction-to-ambient thermal resistance of 357° C/W (derating factor of 2.8 mW/° C).
- Rating refers to a high current point where collector to emitter voltage is lowest.
- Pulse conditions: length = 300 μs ; duty cycle = 1%.
- For product family characteristic curves, refer to Curve Set T212.

* Package mounted on 99.5% alumina 8 mm x 8 mm x 0.6 mm.

PN/MPS/FTSO3638
PN/MPS/FTSO3638A

T-37-15

ELECTRICAL CHARACTERISTICS (25° C Ambient Temperature unless otherwise noted) (Note 6)

SYMBOL	CHARACTERISTIC	3638		3638A		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
h_{FE}	DC Pulse Current Gain (Note 5) (MPS3638)	20		100			$I_C = 10 \text{ mA}$, $V_{CE} = -10 \text{ V}$ $I_C = 10 \text{ mA}$, $V_{CE} = -10 \text{ V}$ $I_C = 1.0 \text{ mA}$, $V_{CE} = -10 \text{ V}$ $I_C = 50 \text{ mA}$, $V_{CE} = -1.0 \text{ V}$ $I_C = 300 \text{ mA}$, $V_{CE} = -2.0 \text{ V}$
		30		80			
		20		100			
$V_{CE(sus)}$	Collector to Emitter Sustaining Voltage (Notes 4 & 5)	-25		-25		V	$I_C = 10 \text{ mA}$, $I_B = 0$
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Pulsed) (Note 5)		-0.25 -1.0		-0.25 -1.0	V V	$I_C = 50 \text{ mA}$, $I_B = 2.5 \text{ mA}$ $I_C = 300 \text{ mA}$, $I_B = 30 \text{ mA}$
$V_{BE(sat)}$	Base to Emitter Saturation Voltage (Note 5)	-0.8	-1.1 -2.0	-0.8	-1.1 -2.0	V V	$I_C = 50 \text{ mA}$, $I_B = 2.5 \text{ mA}$ $I_C = 300 \text{ mA}$, $I_B = 30 \text{ mA}$
C_{ob}	Common Base Open Circuit, Output Capacitance		20		10	pF	$V_{CB} = -10 \text{ V}$, $I_E = 0$, $f = 140 \text{ kHz}$
C_{ib}	Common Base Open Circuit, Input Capacitance (PN3638A) (MPS3638A)		65		35 25	pF pF	$V_{EB} = -0.5 \text{ V}$, $I_C = 0$, $f = 140 \text{ kHz}$ $V_{EB} = -0.5 \text{ V}$, $I_C = 0$, $f = 140 \text{ kHz}$
h_{fe}	Magnitude of Small Signal Current Gain	1.0		1.5			$I_C = 50 \text{ mA}$, $V_{CE} = -3.0 \text{ V}$, $f = 100 \text{ MHz}$
h_{fe}	Small Signal Current Gain (PN3638)	25					$I_C = 10 \text{ mA}$, $V_{CE} = -10 \text{ V}$, $f = 1.0 \text{ kHz}$
	(MPS3638)	25	180	100			$I_C = 10 \text{ mA}$, $V_{CE} = -10 \text{ V}$, $f = 1.0 \text{ kHz}$ $I_C = 10 \text{ mA}$, $V_{CE} = -10 \text{ V}$, $f = 1.0 \text{ kHz}$
h_{ie}	Input Resistance (MPS3638)		2000 1500		2000	Ω Ω	$I_C = 10 \text{ mA}$, $V_{CE} = 10 \text{ V}$, $f = 1.0 \text{ kHz}$
h_{oe}	Output Conductance		1200		1200	μmhos	$I_C = 10 \text{ mA}$, $V_{CE} = -10 \text{ V}$, $f = 1.0 \text{ kHz}$
h_{re}	Voltage Feedback Ratio		2600		1500	$\times 10^{-6}$	$I_C = 10 \text{ mA}$, $V_{CE} = -10 \text{ V}$, $f = 1.0 \text{ kHz}$
t_{on}	Turn On Time (test circuit no. 536)		75		75	ns	$I_C \approx 300 \text{ mA}$, $I_{B1} \approx 30 \text{ mA}$, $V_{CC} = 10 \text{ V}$
t_{off}	Turn Off Time (test circuit no. 536)		170		170	ns	$I_C \approx 300 \text{ mA}$, $I_{B1} \approx I_{B2} \approx 30 \text{ mA}$, $V_{CC} = 10 \text{ V}$

3469674 FAIRCHILD SEMICONDUCTOR

84D 27424

D

PN/MPS/FTSO3639**PN/MPS/FTSO3640**PNP High Speed Saturated Logic
Switches*T-37-15*

- $V_{CE0} \dots 12 \text{ V (Min) (PN/MPS3640)}$
- $t_{on} \dots 25 \text{ ns (Max) @ } 50 \text{ mA, } 60 \text{ ns (Max) @ } 10 \text{ mA;}$
- $t_{off} \dots 35 \text{ ns (Max) @ } 50 \text{ mA, } 75 \text{ ns (Max) @ } 10 \text{ mA}$
- Complements ... PN4274, 2N5769

PACKAGE

PN3639	TO-92
PN3640	TO-92
MPS3639	TO-92
MPS3640	TO-92
FTSO3639	TO-236AA/AB
FTSO3640	TO-236AA/AB

ABSOLUTE MAXIMUM RATINGS (Note 1)**Temperatures**

Storage Temperature	-55° C to 150° C
Operating Junction Temperature	150° C

Power Dissipation (Notes 2 & 3)

Total Dissipation at	PN/MPS	FTSO
25° C Ambient Temperature	0.625 W	0.350 W*
25° C Case Temperature	1.0 W	

Voltages & Currents

	3639	3640
V_{CE0} Collector to Emitter Voltage (Note 4)	-6 V	-12 V
V_{CBO} Collector to Base Voltage	-6 V	-12 V
V_{EBO} Emitter to Base Voltage	-4.0 V	-4.0 V
I_C Collector Current	80 mA	80 mA

ELECTRICAL CHARACTERISTICS (25° C Ambient Temperature unless otherwise noted) (Note 6)

SYMBOL	CHARACTERISTIC	PN3639		PN3640		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
BV_{CES}	Collector to Emitter Breakdown Voltage	-6.0		-12.0		V	$I_C = 100 \mu\text{A}, V_{BE} = 0$
BV_{CBO}	Collector to Base Breakdown Voltage	-6.0		-12.0		V	$I_C = 100 \mu\text{A}, I_E = 0$
BV_{EBO}	Emitter to Base Breakdown Voltage	-4.0		-4.0		V	$I_E = 100 \mu\text{A}, I_C = 0$
I_{CES}	Collector Reverse Current		50 1.0		50 1.0	nA μA	$V_{CE} = -3.0 \text{ V}, V_{BE} = 0$ $V_{CE} = -6.0 \text{ V}, V_{BE} = 0$ $V_{CE} = -3.0 \text{ V}, V_{BE} = 0, T_A = 65^\circ \text{C}$ $V_{CE} = -6.0 \text{ V}, V_{BE} = 0, T_A = 65^\circ \text{C}$
h_{FE}	DC Pulse Current Gain (Note 5)	30 20	120	30 20	120		$I_C = 10 \text{ mA}, V_{CE} = -0.3 \text{ V}$ $I_C = 50 \text{ mA}, V_{CE} = -1.0 \text{ V}$

NOTES:

- These ratings are limiting values above which the serviceability of any individual semiconductor device may be impaired.
- These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.
- These ratings give a maximum junction temperature of 150° C and (TO-92) junction-to-case thermal resistance of 125° C/W (derating factor of 8.0 mW/° C); junction-to-ambient thermal resistance of 200° C/W (derating factor of 5.0 mW/° C); (TO-236) junction-to-ambient thermal resistance of 357° C/W (derating factor of 2.8 mW/° C).
- Rating refers to a high current point where collector to emitter voltage is lowest.
- Pulse conditions: length = 300 μs; duty cycle = 1%.
- For product family characteristic curves, refer to Curve Set T292.
- * Package mounted on 99.5% alumina 8 mm x 8 mm x 0.6 mm.

PN/MPS/FTSO3639

PN/MPS/FTSO3640

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ELECTRICAL CHARACTERISTICS (25° C Ambient Temperature unless otherwise noted) (Note 6)

SYMBOL	CHARACTERISTIC	PN3639		PN3640		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
$V_{CE(sus)}$	Collector to Emitter Sustaining Voltage (Note 5)	-6.0		-12		V	$I_C = 10 \text{ mA}$, $I_B = 0$
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Note 4)		-0.16		-0.2	V	$I_C = 10 \text{ mA}$, $I_B = 1.0 \text{ mA}$
			-0.5		-0.6	V	$I_C = 50 \text{ mA}$, $I_B = 5.0 \text{ mA}$
			-0.25		-0.3	V	$I_C = 10 \text{ mA}$, $I_B = 0.5 \text{ mA}$
			-0.23		-0.25	V	$I_C = 10 \text{ mA}$, $I_B = 1.0 \text{ mA}$, $T_A = 65^\circ \text{ C}$
$V_{BE(sat)}$	Base to Emitter Saturation Voltage (Note 5)	-0.75	-0.95	-0.75	-0.95	V	$I_C = 10 \text{ mA}$, $I_B = 0.5 \text{ mA}$
		-0.8	-1.0	-0.8	-1.0	V	$I_C = 10 \text{ mA}$, $I_B = 1.0 \text{ mA}$
			1.5		1.5	V	$I_C = 50 \text{ mA}$, $I_B = 5.0 \text{ mA}$
C_{ob}	Output Capacitance		3.5		3.5	pF	$V_{CB} = -5.0 \text{ V}$, $I_E = 0$, $f = 140 \text{ kHz}$
			5.5		5.5	pF	$V_{CB} = 0$, $I_E = 0$, $f = 140 \text{ kHz}$
C_{ib}	Input Capacitance		3.5		3.5	pF	$V_{EB} = -0.5 \text{ V}$, $I_C = 0$, $f = 140 \text{ kHz}$
h_{fe}	High Frequency Current Gain	3.0		3.0			$I_C = 10 \text{ mA}$, $V_{CB} = 0$, $f = 100 \text{ MHz}$
		5.0		5.0			$I_C = 10 \text{ mA}$, $V_{CE} = -5.0 \text{ V}$, $f = 100 \text{ MHz}$
τ_s	Storage Time (test circuit no. 234)		30		50	ns	$I_C \approx 10 \text{ mA}$, $I_{B1} \approx I_{B2} \approx 10 \text{ mA}$, $V_{CC} = 3.0 \text{ V}$
t_{on}	Turn On Time (test circuit no. 235) (test circuit no. 219)		25		25	ns	$I_C \approx 50 \text{ mA}$, $I_{B1} \approx 5.0 \text{ mA}$, $V_{CC} = 6.0 \text{ V}$
			60		60	ns	$I_C \approx 10 \text{ mA}$, $I_{B1} \approx 0.5 \text{ mA}$, $V_{CC} = -1.5 \text{ V}$
t_{off}	Turn Off Time (test circuit no. 235) (test circuit no. 219)		25		35	ns	$I_C \approx 50 \text{ mA}$, $I_{B1} \approx I_{B2} \approx 5.0 \text{ mA}$, $V_{CC} = 6.0 \text{ V}$
			60		75	ns	$I_C \approx 10 \text{ mA}$, $I_{B1} \approx I_{B2} \approx 0.5 \text{ mA}$, $V_{CC} = 1.5 \text{ V}$

SYMBOL	CHARACTERISTIC	MPS3639		MPS3640		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
BV_{CES}	Collector to Emitter Breakdown Voltage	-6.0		-12.0		V	$I_C = 100 \mu\text{A}$, $V_{BE} = 0$
BV_{CBO}	Collector to Base Breakdown Voltage	-6.0		-12.0		V	$I_C = 100 \mu\text{A}$, $I_E = 0$
BV_{EBO}	Emitter to Base Breakdown Voltage	-4.0		-4.0		V	$I_E = 100 \mu\text{A}$, $I_C = 0$
I_{CES}	Collector Reverse Current		10		10	nA	$V_{CE} = -3.0 \text{ V}$, $V_{BE} = 0$
			1.0		1.0	nA	$V_{CE} = -6.0 \text{ V}$, $V_{BE} = 0$
						μA	$V_{CE} = -3.0 \text{ V}$, $V_{BE} = 0$, $T_A = 65^\circ \text{ C}$
						μA	$V_{CE} = -6.0 \text{ V}$, $V_{BE} = 0$, $T_A = 65^\circ \text{ C}$

PN/MPS/FTSO3639

PN/MPS/FTSO3640

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SYMBOL	CHARACTERISTIC	MPS3639		MPS3640		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
h_{FE}	DC Pulse Current Gain (Note 5)	30 20	120	30 20	120		$I_C = 10 \text{ mA}$, $V_{CE} = -0.3 \text{ V}$ $I_C = 50 \text{ mA}$, $V_{CE} = -1.0 \text{ V}$
$V_{CE(sus)}$	Collector to Emitter Sustaining Voltage (Note 5)	-6.0		-12		V	$I_C = 10 \text{ mA}$, $I_B = 0$
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Note 5)		-0.16		-0.2	V	$I_C = 10 \text{ mA}$, $I_B = 1.0 \text{ mA}$
			-0.5		-0.6	V	$I_C = 50 \text{ mA}$, $I_B = 5.0 \text{ mA}$
			-0.23		-0.25	V	$I_C = 10 \text{ mA}$, $I_B = 1.0 \text{ mA}$, $T_A = 65^\circ \text{ C}$
$V_{BE(sat)}$	Base to Emitter Saturation Voltage (Note 5)	-0.75	-0.95	-0.75	-0.95	V	$I_C = 10 \text{ mA}$, $I_B = 0.5 \text{ mA}$
		-0.8	-1.0	-0.8	-1.0	V	$I_C = 10 \text{ mA}$, $I_B = 1.0 \text{ mA}$
			1.5		1.5	V	$I_C = 50 \text{ mA}$, $I_B = 5.0 \text{ mA}$
C_{ob}	Output Capacitance		3.5		3.5	pF	$V_{CB} = -5.0 \text{ V}$, $I_E = 0$, $f = 140 \text{ kHz}$
C_{ib}	Input Capacitance		3.5		3.5	pF	$V_{EB} = -0.5 \text{ V}$, $I_C = 0$, $f = 140 \text{ kHz}$
h_{fe}	High Frequency Current Gain	3.0					$I_C = 10 \text{ mA}$, $V_{CB} = 0$, $f = 100 \text{ MHz}$
		5.0		5.0			$I_C = 10 \text{ mA}$, $V_{CE} = -5.0$, $f = 100 \text{ MHz}$
t_{on}	Turn On Time (test circuit no. 235) (test circuit no. 219)		25		25	ns	$I_C \approx 50 \text{ mA}$, $I_{B1} \approx 5.0 \text{ mA}$, $V_{CC} = 6.0 \text{ V}$
			60		60	ns	$I_C \approx 10 \text{ mA}$, $I_{B1} \approx 0.5 \text{ mA}$, $V_{CC} = -1.5 \text{ V}$
t_{off}	Turn Off Time (test circuit no. 235) (test circuit no. 219)		25		35	ns	$I_C \approx 50 \text{ mA}$, $I_{B1} \approx I_{B2} \approx 5.0 \text{ mA}$, $V_{CC} = -6.0 \text{ V}$
			60		75	ns	$I_C \approx 10 \text{ mA}$, $I_{B1} \approx I_{B2} \approx 0.5 \text{ mA}$, $V_{CC} = 1.5 \text{ V}$



PN3641/FTSO3641 T-29-23
PN3642/FTSO3642
PN3643/FTSO3643
 NPN General Purpose Small Signal
 Amplifiers

- V_{CEO} ... 30 V (Min) (PN/FTSO3641, PN/FTSO3643), 45 V (Min) (PN/FTSO3642)
- h_{FE} ... 100 (Min) @ 150 mA, 25 (Min) @ 500 mA (PN/FTSO3643)
- P_G ... 400 mW RF Power Out at 30 MHz
- f_T ... 250 MHz (Min) (PN3643)
- t_{on} ... 60 ns (Max) @ 300 mA, t_{off} ... 150 ns (Max) @ 300 mA
- Complements ... MPS3638/A, PN3644

PACKAGE

PN3641	TO-92
PN3642	TO-92
PN3643	TO-92
FTSO3641	TO-236AA/AB
FTSO3642	TO-236AA/AB
FTSO3643	TO-236AA/AB

ABSOLUTE MAXIMUM RATINGS (Note 1)**Temperatures**

Storage Temperature	-55° C to 150° C
Operating Junction Temperature	150° C

Power Dissipation (Notes 2 & 3)

	PN	FTSO
Total Dissipation at 25° C Ambient Temperature	0.625 W	0.350 W*
25° C Case Temperature	1.0 W	

Voltages & Currents

	3641/3	3642
V_{CEO} Collector to Emitter Voltage (Note 4)	30 V	45 V
V_{CBO} Collector to Base Voltage	60 V	60 V
V_{EBO} Emitter to Base Voltage	5.0 V	5.0 V
I_C Collector Current	500 mA	500 mA

ELECTRICAL CHARACTERISTICS (25° C Ambient Temperature unless otherwise noted) (Note 6)

SYMBOL	CHARACTERISTIC	3641		3642		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
$BV_{CEO(sus)}$	Collector to Emitter Breakdown Voltage (Notes 4 & 5)	30		45		V	$I_C = 10$ mA, $I_B = 0$
BV_{CES}	Collector to Emitter Breakdown Voltage	60		60		V	$I_C = 10$ μ A, $V_{BE} = 0$
BV_{CBO}	Collector to Base Breakdown Voltage	60		60		V	$I_C = 10$ μ A, $I_E = 0$
BV_{EBO}	Emitter to Base Breakdown Voltage	5.0		5.0		V	$I_E = 10$ μ A, $I_C = 0$

NOTES:

- These ratings are limiting values above which the serviceability of any individual semiconductor device may be impaired.
- These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.
- These ratings give a maximum junction temperature of 150° C and (TO-92) junction-to-case thermal resistance of 125° C/W (derating factor of 8.0 mW/° C); junction-to-ambient thermal resistance of 200° C/W (derating factor of 5.0 mW/° C); (TO-236) junction-to-ambient thermal resistance of 357° C/W (derating factor of 2.8 mW/° C).
- Rating refers to a high current point where collector to emitter voltage is lowest.
- Pulse conditions: length = 300 μ s; duty cycle = 1%.
- For product family characteristic curves, refer to Curve Set T145.

* Package mounted on 99.5% alumina 8 mm x 8 mm x 0.6 mm.

PN3641/FTSO3641

PN3642/FTSO3642

PN3643/FTSO3643

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ELECTRICAL CHARACTERISTICS (25° C Ambient Temperature unless otherwise noted) (Note 6)

SYMBOL	CHARACTERISTIC	3641		3642		UNITS	TEST CONDITIONS
		MIN	MAX	MIN	MAX		
I_{CES}	Collector Cutoff Current (Note 5)		50 1.0		50 1.0	nA μ A	$V_{CE} = 50$ V, $V_{BE} = 0$ $V_{CE} = 50$ V, $V_{BE} = 0$, $T_A = 65^\circ$ C
h_{FE}	DC Pulse Current Gain (Note 5)	40 15	120	40 15	120		$I_C = 150$ mA, $V_{CE} = 10$ V $I_C = 500$ mA, $V_{CE} = 10$ V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Note 5)		0.22		0.22	V	$I_C = 150$ mA, $I_B = 15$ mA
C_{ob}	Output Capacitance		8.0		8.0	pF	$V_{CB} = 10$ V, $I_E = 0$, $f = 140$ kHz
h_{fe}	Magnitude of Common Emitter, Short Circuit Small Signal Current Gain	1.5		1.5			$I_C = 50$ mA, $V_{CE} = 5.0$ V, $f = 100$ MHz
G_{PE}	Amplifier Power Gain (test circuit no. 238)	10		10		dB	(Zero Signal) $V_{CE} = 15$ V, $I_C = 0$, $R_G = 140 \Omega$, $R_L = 260 \Omega$, $f = 30$ MHz, $P_{IN} = 40$ mW
η	Collector Efficiency (test circuit no. 238)	60		60		%	(Zero Signal) $V_{CE} = 15$ V, $I_C = 0$, $R_G = 140 \Omega$, $R_L = 260 \Omega$, $f = 30$ MHz, $P_{IN} = 40$ mW
t_{on}	Turn On Time (test circuit no. 241)		60		60	ns	$I_C \approx 300$ mA, $I_{B1} \approx 30$ mA,
t_{off}	Turn Off Time (test circuit no. 242)		150		150	ns	$I_C \approx 300$ mA, $I_{B1} \approx I_{B2} = 30$ mA

SYMBOL	CHARACTERISTIC	3643		UNITS	TEST CONDITIONS
		MIN	MAX		
$BV_{CEO(sus)}$	Collector to Emitter Breakdown Voltage (Notes 4 & 5)	30		V	$I_C = 10$ mA, $I_B = 0$
BV_{CES}	Collector to Emitter Breakdown Voltage	60		V	$I_C = 10 \mu$ A, $V_{BE} = 0$
BV_{CBO}	Collector to Base Breakdown Voltage	60		V	$I_C = 10 \mu$ A, $I_E = 0$
BV_{EBO}	Emitter to Base Breakdown Voltage	5.0		V	$I_E = 10 \mu$ A, $I_C = 0$
I_{CES}	Collector Cutoff Current (Note 5)		50 1.0	nA μ A	$V_{CE} = 50$ V, $V_{BE} = 0$ $V_{CE} = 50$ V, $V_{BE} = 0$, $T_A = 65^\circ$ C
h_{FE}	DC Pulse Current Gain (Note 5)	100 25	300		$I_C = 150$ mA, $V_{CE} = 10$ V $I_C = 500$ mA, $V_{CE} = 10$ V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Note 5)		0.22	V	$I_C = 150$ mA, $I_B = 15$ mA

PN3641/FTSO3641

PN3642/FTSO3642

PN3643/FTSO3643

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ELECTRICAL CHARACTERISTICS (25° C Ambient Temperature unless otherwise noted) (Note 6)

SYMBOL	CHARACTERISTIC	3643		UNITS	TEST CONDITIONS
		MIN	MAX		
C_{ob}	Output Capacitance		8.0	pF	$V_{CB} = 10\text{ V}$, $I_E = 0$, $f = 140\text{ kHz}$
h_{fe}	Magnitude of Common Emitter, Short Circuit Small Signal Current Gain	2.5			$I_C = 50\text{ mA}$, $V_{CE} = 5.0\text{ V}$, $f = 100\text{ MHz}$
G_{PE}	Amplifier Power Gain (test circuit no. 238)	10		dB	(Zero Signal) $V_{CE} = 15\text{ V}$, $I_C = 0$, $R_G = 140\ \Omega$, $R_L = 260\ \Omega$, $f = 30\text{ MHz}$, $P_{IN} = 40\text{ mW}$
η	Collector Efficiency (test circuit no. 238)	60		%	(Zero Signal) $V_{CE} = 15\text{ V}$, $I_C = 0$, $R_G = 140\ \Omega$, $R_L = 260\ \Omega$, $f = 30\text{ MHz}$, $P_{IN} = 40\text{ mW}$
t_{on}	Turn On Time (test circuit no. 241)		60	ns	$I_C \approx 300\text{ mA}$, $I_{B1} \approx 30\text{ mA}$,
t_{off}	Turn Off Time (test circuit no. 242)		150	ns	$I_C \approx 300\text{ mA}$, $I_{B1} \approx I_{B2} = 30\text{ mA}$